

1 TO WHOM IT MAY CONCERN:

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3 BE IT KNOWN THAT I, JAMES M. GALVEZ, a
4 citizen of the United States of America, residing in
5 Pasadena, in the County of Los Angeles, State of
6 California, have invented a new and useful improvement
7 in

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10 PORTABLE, LED ILLUMINATOR

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BACKGROUND OF THE INVENTION

 This invention relates generally to portable illumination devices and more particularly to an improved device wherein LEDs are provided within an elongated, hand-held portable carrier.

 There is need for improvements in portable illumination devices wherein complexity of electrical circuitry required for power supply to LEDs is reduced, and wherein there is no need for a transformer to reduce supply voltage. There is also need for an improved simple, lightweight, rugged device employing an elongated tubular carrier in which a row or rows of LEDs is or are supported, as well as a device having improvements in structure and functions as will be seen.

SUMMARY OF THE INVENTION

 It is a major object of the invention to provide for improvements in portable illumination devices as referred to. Basically, the device comprises:

- a) an elongated portable carrier including a housing and a longitudinal elongated window,

1 b) multiple LEDs carried to emit light
2 toward and through the window,

3 c) and circuitry associated with the
4 housing to supply electrical power to the LEDs, said
5 circuitry incorporating resistor, capacitor and diode
6 elements to reduce AC input voltage to a level for
7 supply to the LEDs.

8 As will be seen, the LEDs are preferably
9 spaced apart longitudinally to face toward the window,
10 the spacing of successive LEDs in a row being at least
11 1.75 centimeters, and the illumination window itself
12 being at least about 12 to 15 inches long. Two such
13 rows of LEDs are preferably provided within a generally
14 tubular plastic housing or carrier between 2 ½ and 4
15 centimeters in overall diameter or cross section.

16 Another object is to provide a hand grip
17 sleeve fitting over one end portion of the generally
18 tubular carrier, the voltage reducing circuitry located
19 at least partly within that end portion, whereby a non-
20 bulky, rugged, reliable, lightweight illumination
21 device is achieved. A support hook may be associated
22 with the opposite end portion of the carrier, as on a
23 second sleeve fitting that opposite end portion.

24 These and other objects and advantages of the
25 invention, as well as the details of an illustrative

1 embodiment, will be more fully understood from the
2 following specification and drawings, in which:

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DRAWING DESCRIPTION

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6 Fig. 1 is a side elevation showing a
7 preferred device incorporating the invention;

8 Fig. 2 is a view taken on lines 2-2 of Fig.
9 1, showing the LEDs;

10 Fig. 3 is an enlarged section taken on lines
11 3-3 of Fig. 2;

12 Fig. 4 is a view taken on lines 4-4 of Fig.3;
13 and

14 Fig. 5 is an LED circuit diagram.

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DETAILED DESCRIPTION

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18 In Figs. 1 and 2, the illumination device 10
19 includes an elongated portable carrier 11, having a
20 housing and a longitudinally elongated window 12'. The
21 housing may be integrated with the window, and may
22 comprise a generally tubular body, or tube 12 which may
23 consist of rigid, transparent, plastic material. The
24 window 12', i.e. exposed section of the tube 12,

1 extends between or is exposed between locations 13 and
2 14 shown in Fig. 2.

3 Multiple LEDs 20 are carried to emit light
4 through the window, generally in direction 21,
5 indicated in Fig. 1. The length of the window, for
6 example between 12 and 15 inches, achieves a
7 concentrated light beam of that width indicated at 22
8 in Fig. 3. The overall diameter of the tube is
9 preferably between 2 ¼ and 4 centimeters.

10 The LEDs are typically carried by a thin
11 circuit board 24 extending within the tube 12, with
12 board edges 25 engaging the tube bore 26, for stable
13 locations of the board and LEDs. The LEDs 20 are
14 indicated as spaced apart in two rows 27a and 27b to
15 face the internal side of the window 12'. The LEDs are
16 preferably alike, whereby the beam intensity is
17 approximately the same across width 22 and along the
18 window length. The successive LED spacing ''s'' in
19 each row is at least about 1.75 centimeters, and
20 preferably about 2.00 centimeters, for optimum
21 illumination.

22 Figs. 3 and 4 show LED wires or terminals 30
23 and 31 projecting through the board, to mount the LEDs,
24 and engaging spaced planar electrical conductor areas
25 32 on the back side of the board. Note gaps 32a
26 between 32. The LEDs are electrically connected in

1 series, as is seen in Fig. 5. That view also shows
2 resistor, capacitor, and diode circuitry at 36 for
3 reducing voltage supplied at 33 from 120 volts to about
4 12 volts applied to the LEDs.

5 The circuitry 36 includes branch 38
6 containing resistor 39 in series with parallel
7 connected diodes 40 and 41, reversely poled, as shown.
8 Branch 42 includes resistor 43 in series with parallel
9 connected diodes 44 and 45, reversely poled as shown.
10 Diodes 41 and 45 are connected via DC carrying line 46
11 to a circuit 47 at one end 48 of the LED sequence.
12 Diodes 40 and 44 are connected via line 50 to the
13 opposite end 51 of the LED sequence. A capacitor 57
14 and a transient suppressor 58 are connected across
15 branches 38 and 42; and circuit 47 includes a parallel
16 capacitor 54 and resistor 55, and a voltage regulator
17 56. All LEDs may be identified as NSPW500B5
18 components, and are connected in series. Typically,
19 voltage drops from about 107 volts to 30 volts across
20 the LED sequence.

21 A protective sleeve 60 fits over one end
22 portion of the tube or body 12 as shown in Figs. 1 and
23 2. It encloses the circuitry 36 other than the diodes,
24 such circuitry typically mounted on the circuit board,
25 and sleeve 60 may be bonded to the tube. It provides
26 a grip for the user's hand manipulation. Current

1 supply wire 70 extends through the grip, to an
2 electrical plug 71, connectable to 60 cycle, 120 volt
3 AC. A protective sleeve 72 is received on the opposite
4 end portion of tube 12, and may carry a hook 74, to
5 hang the illumination apparatus onto equipment being
6 worked on.

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